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HEARING

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Von Liebermann and Révész (6) appear to have demonstrated the possibility of a tonal mixture analogous to color mixture in the pathological case of v. L. His chronic paracusis occasions the hearing of a tone of constant vibration frequency differently in his two ears. The resultant impression is a mean tone which corresponds to the arithmetic average of the two apparent tones. To determine the mean tone objectively it was compared with a lower tone lying within the range of v.L.'s normal hearing. In this way the corresponding vibration frequencies of the right and left ear tones, and of the mean or mixed tone, were determined. The mixed tone always appeared between the right and left ear tones, and could be varied at will between these limits by a corresponding variation in intensity of the stimulus as conducted to the two ears. For normal hearing the phenomenon is apparent only as an increase in intensity when a single tone is conducted to both ears rather than to one. For tones of different pitch separately conducted this is not the case. The authors are led to assume corresponding points for like tones in the two ears, similar to the corresponding points of the retinæ. This indicates, presumably, conduction from such corresponding points to a single brain region.

Watt (23) subjects the recent work of Jaensch, Köhler, Révész and others[1] to a careful analysis, and attempts to bring their results into accord with his own theory of the attributes of sound as

[1] Cf. Hearing, the BULLETIN, 1914, 96–105.

set forth in a previous article.[2] "Pitch" he regards as an attribute of *order*. It is essentially what Révész calls "quality," though not confined to the limits of an octave as Révész proposes. What Révész calls "Höhe" is for Watt "volume." "We have then to suppose that the ear provides us with a single series of orders; pitch is judged by the most prominent order; interval by the 'form' constituted by the prominent orders; volume by the line or mass of orders stimulated at all; pitches and intervals can therefore be compared and fixed to some extent by means of volumes alone." Neither pitch nor volume as such are spatial. "They are simply systemic, *i. e.*, such orders and such continuousness as will with sufficient variation of order constitute a sensory system." Jaensch's results regarding the transition from tone through vowel to noise are accepted, but no reason is found for the assumption of a specific noise sense, older in the race than the sense of tone. Variation in definiteness of pitch, due to increase in number of different vibration frequencies is held to induce this change in the sound. As for the definite location of vowels in the pitch series, it is suggested "that the mouth for some reason or other chooses to form such a cavity for some one vowel that it gives a certain average tone, and that the other vowel sounds are chosen, owing to the otherwise and already existing octave relationship, in relation to this primary vowel."

The author proceeds to sketch a theory of hearing on the principle of stimulations which excite regions rather than isolated fibers of the basilar membrane. It is argued that primitive hearing is sensible only to high tones produced from the region at the base of the cochlea. The point of maximal stimulation in the portion of the membrane which is excited is responsible for the pitch of a sound. This is clearly defined only in the case of simple pendular-formed stimuli, or such complexes as involve simple relations between the regions stimulated. Thus the octave relationship is derived from coincidence of volume. The extent of the membrane aroused by a higher tone always coincides with a portion of the extent aroused by a lower tone, and in the case of the octave the extent of the latter will be just twice that of the former. Low tones are prominent in chords because the maximum of the lowest tone always extends beyond the maxima of the higher tones present. Tones, therefore, correspond to regular systems of sound; noises

[2] Cf. "The Elements of Experience and their Integration: or Modalism," *Brit. J. of Psychol.*, 1911, 4, 127–204.

to irregular systems. The pitch of noise is thus obscured. Distance is a primitive mode; interval a more refined musical mode. Simultaneous and successive intervals differ in that pitches only can be analyzed in simultaneous intervals, whereas in successive intervals pitch, intensity, and volume all stand out clearly. For this reason, as von Maltzew has pointed out, descending and ascending intervals of the same notes are not apprehended alike.

Meyer (**8**) referring to Révész's distinction of "pitch" and "quality," calls attention to his own differentiation of attributes made public in 1898, and remarks that the suggestion came to him from Stumpf, who quoted still earlier psychologists. The question of priority is thus inconsiderable, yet the importance of an unambiguous terminology is very great. Meyer had previously used the terms "quality" and "pitch" in direct opposition to Révész's usage. It is now proposed, in the interest of uniformity, that "vocality" be used for the attribute of mellowness and shrillness, height or volume, while "tonality" be adopted to express the qualitative pitch distinction of Révész.

Valentine (**19**) reports investigations on the appreciation of musical intervals. His subjects numbered 146 adults and 271 children. The intervals were played upon a piano and the judgments recorded immediately after the intervals had been sounded. The order of pleasingness indicated by the average of adult reports was as follows: major third, minor third, octave, major sixth, minor sixth, fourth, tritone, fifth, major second, minor seventh, major seventh and minor second. The last four were judged displeasing. One hundred and ninety-five school children between the ages of six and fourteen indicated no special preferences before the age of nine. At twelve and thirteen, however, their average order was remarkably like that of the adults. There was no appreciable difference in the preferences of the more and less intelligent, nor any correlation found between general ability and certain simple tests of musical capacity. Seventy-six girls of a preparatory school where music was a part of the curriculum showed aversion to discords at the ages of seven and eight, and at nine the order of preference was similar to that of the adults. Two interesting by-products of this investigation may be noted, although under the conditions of experimentation employed the results can hardly be regarded as established. It appeared that nine out of twelve adults, specially tested, found the higher note of an interval to determine its pitch rather than the lower note, as is usually assumed to be the case.

The second result was the detection of more frequent judgments of "sad" and "plaintive" attaching to the major third and sixth than to the minor third and sixth.

In a subsequent investigation (20) Valentine contrasted the results of comparing pairs of intervals with judgments of single intervals. The piano was again used with five musical observers. The method of comparison gave different results from that with single intervals. The general æsthetic value of judgments by the method of comparison seemed less. In the course of the experiments three of the observers showed a striking change in their appreciation of discords, these tending to become more pleasing. The change sometimes occurred after a few seconds. The author suggests a kind of adaptation to discords comparable, perhaps, to what takes place in the development of music. This lends support to the theory suggested by C. S. Myers[2] that the perception of consonance and dissonance is dependent, partly at least, upon frequent association. Moore (10) defends this thesis as to the genesis of consonance. His experiments dealt chiefly with the fifth, major third, major and minor seventh produced on a reed organ of tempered intonation. After periods of adaptation to the sevenths, through prolongation and repetition of such an interval, his nine observers indicated marked differences in their judgments of consonance when comparing the four intervals. The major third was found to lose rapidly, while the minor seventh gained rapidly in consonance. The major seventh also gained, though less rapidly, while the fifth maintained a constant level. It is concluded that the greatest pleasure in intervals is attained with a bare consonance. With greater degrees of consonance an affective decline is noted, but this is followed by a certain rise when the stable unitary effects of the fifth and octave are reached. The minor seventh is regarded as nearest the consonant region, while the major third, after adaptation, is found to have passed its zenith of interest. The fifth retains its relative consonance because of its greater stability. Marage (7) contributes also to our knowledge of the effects of habituation. In comparing musical pieces of the 16th and 17th centuries when performed successively upon the piano and upon instruments of the epoch, clavecin, clavichord, lute and viol, his numerous observers reported at first that the metallic tones of the clavecin

[2] Cf. *Text-Book of Experimental Psychology*, 2d ed., p. 55. An earlier reference and more complete statement is found in *Brit. J. of Psychol.*, 1905, 1, 315–316. An independent sketch for such a theory is given by Ogden, the BULLETIN, 1909, 6, 297–303.

were disagreeable, but speedily they became endurable and finally were regarded as "possédant certains qualités." The ear was found to accommodate itself very quickly. After the first séance the pianist complained that his instrument must have been changed, since, in comparison with the primitive instruments, it no longer seemed to give harmonious effects.

Myers (11), to some extent in collaboration with Valentine, has given a detailed analysis of the introspections of twenty-nine subjects of the two sexes relative to their attitudes towards single tones, bichords and pairs of bichords. The tones were produced by ten tuning forks varying in vibration from 400 to 1,300 per second. In line with the analyses of Bullough on color[4] the author distinguishes four aspects of attitude: (1) Intra-subjective (cognitive, physiological, emotional, and conative). (2) Objective (appreciation of the sound as having a meaning or use, and as in relation to the subject's standard of purity). (3) Character (anthropomorphic suggestions). (4) Associative (with instruments, music, or surroundings, and symbolic suggestions). Among the results indicated it may be noted that the objective aspect appears to increase with judgments of preference, and to be responsible for instances of indifferent appreciation and impossibility of making comparison.

In a volume of studies from the University of Iowa, the editor has assembled nine papers, eight of which fall within our field. The first paper (15) is Seashore's description of his tonoscope in its improved form. The instrument affords a means of reading directly the pitch of a tone sung, spoken or played. An outline of the various types of problem which it is adapted to solve is also given. Miles (9), using the instrument with 213 observers, men and women, has tested the accuracy of the human voice in simple pitch singing. The voice is found to be about equally accurate in terms of vibrations at all points within its range, therefore, the high tones are sung relatively more exactly than the low tones. A strong standard tone was reproduced as decidedly lower than a weak standard tone. The voice could most easily reproduce the pitch of tones rich in timbre. Vowel quality in a tone was found to affect accuracy of pitch, the *i* being reproduced highest, the *o* lowest and the *a* between. Men and women sang with equal accuracy within their ranges. With women the general tendency was to sing sharp. The average error was 1.5 v.d. for men at the range of 128 v.d., and the same for women at the range of 256 v.d. The average

[4] Cf. *Brit. J. of Psychol.*, 1908, 2, 406–463.

minimal producible change of voice for men, at the above mentioned range, was 5.5 v.d., and for women, at the octave higher, 3.5 v.d.

Smith's investigation (16) indicates that training in pitch discrimination is very rapid. The approximate physiological threshold was reached at a sitting of less than an hour in more than half the cases of adults and children bright enough to understand the test. The physiological limit was always below the conventional threshold (75 per cent. of right cases), the latter being indicated as 1 v.d. and the former as .25 v.d. Vance (21), repeating some unpublished experiments of Misao Imai, done in the Iowa laboratory, finds the limit of tonality lowered to 13 and 12 v.d. with forks carrying disks of 10 cm. diameter to increase the area of vibration. With a selected group of fifty observers Vance (22) has also tested variations in pitch discrimination at different levels between 64 and 2,048 v.d. The keenest discrimination was found at 128 and 256 v.d. There was slight evidence of tonal gaps, the grosser irregularities disappearing with more extended observations. The women made more accurate judgments when the second tone was higher, and surpassed the men at every level, the variation being greatest at the extremes.

Anderson (1) with four trained observers found the optimal duration of tones for comparison to be one second for the first and one-half second for the second. Short intervals between the tones were better than long. No effect was noted from varying the direction of sound. The accuracy of judgments proved as great under ordinary laboratory conditions as when made within a dark, sound-proof room. Individual tendencies were noted to judge the second tone too high or too low, but no general tendency was detected for the group. Stewart (17) demonstrated individual tendencies to judge weak tones low, and strong tones high; also the reverse. Hancock (4), testing sounds in the region of 128 v.d., found differences in intensity to occasion an illusion of pitch, constant in direction, though variable in amount—a loud sound being judged lower than a faint sound of the same pitch. The average illusion was about 6 v.d. At 512 v.d. a tendency was still to be found, but varied to judgments of higher as well as lower, while at 1,024 v.d. the effect was less disturbing. Sylvester (18), testing the Stern tone variator by the tonoscope, found its greatest accuracy to be attained with 4 gm. pressure and 1.9 mm. mouthpiece gap, but it does not prove to be an instrument for securing accuracy of pitch and interval, since its variations may be from 1.5 v.d. to 10.1 v.d. from their settings.

Rupp's article (14) discusses the chief points to be considered in testing musical capacity. A more detailed and exact discussion of methods is promised in a second paper. Among the problems here considered are the general methods for determining the cognition of tones, determinations of span, thresholds, absolute pitch and timbre. Differential sensitivity, interval sensitivity, cognition of simultaneous intervals, melody, harmony, "takt" and rhythm, and the analysis of sounds are also considered at some length. Balz (2) "is convinced that at bottom music (and all the other arts, for that matter) rests upon the exploitation of that sort of exciting agency which is the 'natural' innately appropriate, and adequate stimulus for the calling forth of an emotion through the excitation of the sense-organs." Thus, specific differences in musical stimuli occasion specific musical emotions. Pieces of music which resemble one another in emotional value will resemble one another in structure. Illustrations are adduced to show that our innate organism responds to certain musical motives, and that our experience develops our sense of emotional reaction. No definite analysis of the structure of the music, or the nature of the corresponding emotions is attempted.

Ter Kuile (5) finds that the ratios of vibration frequency of two or more tones indicates their rank in the scale of consonance when one applies the following formula, where α, β, γ, etc., represent the ratio numbers and p the number of tones in the chord: $\frac{1}{\sqrt[p]{\alpha \cdot \beta \cdot \gamma \cdots}}$. Upon reduction the result varies from 1, in the case of the unisone, downwards. The octave gives 0.71, the fifth, 0.41, the fourth, 0.29, etc. The series closely approximates the order usually attached to the degrees of consonance. The author would appear to regard this as of physiological significance, the explanation, however, is not quite apparent to the reviewer. Benjamins (3), experimenting with the Kundt dust figures, has found variations in the chief partial which correspond to different vowels sung into the tube. When *u*, *o*, *a*, were sung on different notes the partial was found to descend as the pitch of the note rose, but it remained lowest for *u* and highest for *a*. Marked differences were noted in the results of an adult tenor voice, and the voice of a girl of eleven years. For the former, *a* was between 412 and 1,031 v.d., *o*, between 369 and 611 v.d. and *u* between 288 and 402 v.d. For the little girl, *a* was between 916 and 1,100 v.d., *o*, between 458 and 916 v.d. and *u* at 388 v.d. Other vowel sounds are also reported and we may note

the registration of *e* between 397 and 634 v.d. The author concludes that the mouth cavity changes its form as the pitch of the tone being sung is changed. The vowel clang is therefore not independent of the pitch of the voice, although change in pitch may alter the character of the vowel.

Peterson (12), replying to a criticism of Cl. Schaefer, maintains that their views as to the origin of subjective combination tones are not essentially different. All combination tones, subjective and objective, depend upon periodicities external to the sensory end-organs of hearing. Helmholtz's belief that they are located in the middle ear has been found erroneous, yet the same principle employed by him accounts for their existence in the waters of the cochlea. Raman (13) appears able to demonstrate a wide range of vibrations of the combinational variety by recording photographically the vibrations of a string suspended between the prongs of two tuning forks. The summational vibrations were found to be more frequent than the differential. Among those demonstrated, occur vibrations corresponding to the first difference tone and the simple summation tone. No reference is made to any attempt at demonstrating objectivity of combination tones, and the physical effect of the string which records these additional vibrations is not specifically made clear. Wood (24) gives in brief compass a clear and interesting discussion of the physical basis of music. As is the case with most physicists, he holds more closely to the Helmholtz theories than is entirely warranted by the psychologist's results. Despite this limitation, his little volume may be found helpful to students in the study of audition.

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AFFECTIVE PHENOMENA—EXPERIMENTAL

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Rose (9) reports the results of experiments by means of the dynamograph, on the influence of disagreeable sensory stimuli upon the motor effect of voluntary acts. Series of 6 to 36 efforts were made, giving every other three with or without a disagreeable taste. Results were taken with four sorts of preparation of attention on the part of the subject: (1) simple, without special directions except to pull as much as possible; (2) sensory, the subject's

attention is mainly on the signal and he is directed to react only when the signal is heard clearly; (3) motor, the idea of the movement is to be especially held in mind, with the thought of reacting immediately after the signal; (4) muscular, as (3), but with the development of strain in the muscles which are to be used. The latent time between the signal and the beginning of the reaction, the length of the rise of the curve, the total length of the act, and the height of the pull were measured. The introspections of the subjects indicated that the sensory disagreeableness caused an increase in the motor impulse. Some of the subjects found the disagreeable stimulus to be exciting introspectively; the others found no such effect, but were quite passive toward it. They also observed that the type of preparation of attention influenced the motor effect. In most cases, weak, medium, and strong disagreeableness caused a decrease in the latent time of the reaction. The more actively excitable subjects showed a stronger effect than the more passive ones. Sensory disagreeableness of all degrees and with all sorts of preparation of attention gave an increase in the height of the thrust, the more so the stronger the disagreeableness. Moderate to strong disagreeableness with each sort of preparation of attention showed a shortening of the period of rise of the curve when the subject was of the more active type, but showed lengthening of the rise when the subject was of the passive type. The total length of the act was decreased by the disagreeableness with simple preparation of attention and in the active type of subjects with all other preparations; it was increased with sensory, motor, and muscular preparations with the passive type of subjects. Altogether, sensory disagreeableness of all degrees and with all sorts of preparation of attention caused an increase in the motor effects of a voluntary act.

Leschke (6) has again brought together in tabular form the results of various investigators concerning the correlation of feeling and physiological processes. The table indicates a high degree of agreement among the different writers as to what organic changes accompany each type of mental condition. It seems to the reviewer that there are several more or less erroneous interpretations of the literature where a different report would interfere somewhat with the unanimity of results; but we need now to find just where we stand in the study of this question, and Leschke attempts to do it.

Miss Washburn and her students (3) suggest a measure of the tendency to strong affective reactions, whether of pleasantness or

unpleasantness. The number of indifferent judgments in a series is divided by the number of very pleasant judgments plus the number of very unpleasant judgments. Colors cause a strong affective reaction in more observers than articulate sounds do. There appears to be a tendency for observers who are very sensitive or very indifferent to one kind of material to have the same attitude toward the other kind, but this rule has many exceptions.

Direct verbal suggestion (7) regarding the pleasantness or unpleasantness of a color is usually found to have a positive effect upon the judgments. With a few observers there was a much less decided negative effect.

It requires (8) more time to reach a judgment of pleasant or unpleasant if the degree of feeling is moderate than if it is extreme, and it requires still more time to reach a judgment of indifference. There is no difference between judgments of pleasantness and unpleasantness of a given degree.

In the case of subjects who were without knowledge of the experimental method, the feeling character of a color was found (1) to be influenced by affective contrast with a decidedly pleasant or unpleasant color experienced immediately before.

Feleky (5) obtained a number of photographs of the same individual. Each was taken as the subject endeavored to portray a given emotion. The photographs were presented to one hundred persons together with a list of names of emotions. Each person was asked to select the name of the emotion expressed in each picture. Sufficient uniformity was shown to make the method promise valuable results in the study of emotional expression.

Coover (4) studied the possible justification for the belief in "the feeling of being stared at." Ten students who held such belief acted as subjects. The belief was shown to be groundless. The explanation of the "feeling," was found in nervousness, catching someone staring whose attention had been attracted by the nervousness, attributing objective validity to subjective impressions of imagery, kinæsthetic sensations, and impulses.

According to Benussi (2), the ratio of duration of inspiration to duration of expiration is less before making a false statement than afterward and is greater before making a true statement than afterward.

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AFFECTIVE PHENOMENA—DESCRIPTIVE AND THEORETICAL

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Two writers treat generally of "feeling" and "the feelings." Smith (13) wants to know what is the "substrate" which "has" the attributes pleasant, unpleasant, etc. After reviewing, criticizing, combining and variously interpreting current theories, he concludes that it is "a spiritual act or self-position," a character which it shares with cognition and conation. Hence it must be "deduced" from the notion of spiritual life or activity. The result of the analysis of this notion is that all experience, in proportion to its perfection, is feeling and, therefore, pleasure. Pain, or non-feeling, is real only as an element in what as a whole is pleasure. A more fruitful method is followed by Müller-Freienfels (8), the genetic-biologic. According to him psychical phenomena are modifications and specifications of an originally undifferentiated consciousness, appearing in us as "organic consciousness." Sensations proper are biologically explicable developments towards the objective side, that of localization, the feelings are developments of the subjective side. They are not, however, sharply divided from cognitive activities, into which, indeed, they enter as constituents —a point repeatedly emphasized—nor from conative, where the distinction is one of relative passivity and activity, and still less

from organic consciousness. Feelings are psychic entities, not mere attributes, are specific in character and are indefinitely various. There are, *e. g.*, innumerable kinds of feelings classed under the categories of pleasure and displeasure; there is no pleasure or displeasure "an sich."

Notable among the contributions of recent years to the psychology of the affective life is the work of Shand (11), whose theory of the sentiments, originally propounded some twenty years ago in *Mind* and since accepted, in whole or in part, by Stout, Westermarck and W. McDougall, among others, is here developed to establish the foundations of a science of character. The problem is conceived as essentially dynamical. The emotions are forces connected with instincts. Their analysis into sensations and feelings having value as reflecting bodily changes is subordinate to the tracing of their tendencies, at first their biological, later their value for the higher ends of character. A fundamental conception in the author's treatment is that of system. As in the body there are certain greater and certain lesser systems, so in the character. Here there are three orders of such systems: (1) The simplest—the impulses, each including an instinctive or other tendency; (2) the appetites and emotions, including some of the former tendencies; and (3) the most complex—the sentiments, including some of both the preceding systems. The organic laws of character are those of our instincts, emotions and sentiments, and of such laws the author formulates 144. We are reminded of Spinoza, but the method here is entirely different, not deductive, but empirical; the fundamental conceptions are taken as working hypotheses and the conclusions, instead of being considered final, are regarded as always probably in some measure false. This is not the place to refer to the details of an extensive treatise acute in observation, subtle in argument and rich in literary illustration, but the attention of those interested may well be called to the excellent chapter on the temperaments, which are treated from the point of view that a man's temperament is determined by the "temper" of his emotions, *i. e.*, by the way in which his emotions are felt and manifested. In another direction Müller-Freienfels (9) traces the influence of specific types of emotion and emotional dispositions, as they predominate in individuals and in societies at different periods and stages of civilization, on religion, literature, art and philosophy. In showing the contribution made by each type—emotions of depressed and heightened self-feeling and of the aggressive and

sympathetic social instincts, as well as emotions of the sexual life—the paper is in part a protest against the Freudian tendency to attribute creative functions solely to the erotic impulse. Ribot (10), while also criticizing the attempt to explain everything by the sexual instinct, ascribes to psycho-analysis credit for having thrown light on the processes of affective logic, particularly in its lower forms, and on the processes of creative imagination in its study of dreams. He himself proposes the hypothesis that creative imagination is a form of the transformation of energy and says that this should find favor with the analysts, who ascribe the same origin to creative imagination as to physical procreation.

The amorous sentiment itself is examined by Kostyleff (4, 5). Starting with the view that the synthetic image, objectively a bundle of reflexes, which governs the sentiment, may be wholly or partially unconscious, he concludes, after reviewing recent cases of general, diffuse erotism reported by the Freudians, that in normal love the "erotic complex" is composed of fragmentary and delicate reflexes associated with a diffuse reaction, and accordingly unconscious. Regarding the formation of the erotic complex he takes sharp issue, in a second article, with the Freudian account of it as derived from infantile erotism centered, *e. g.*, on the mother, and ascribes it rather to isolated reflexes of a perceptive or emotional order. Balz (1), basing his evidence on general musical experience, seeks to show that differences in the emotional reactions of the trained musical auditor are correlated with specific differences in the various complexes of the air-vibrations, regard being had, fundamentally, to innate organization and, secondarily, to familiarization. Dwelshauvers (2) contends that the sentiment of art, at least in its highest forms, and the sentiment of religion spring from the same movement of sympathy between what is spiritual in ourselves and what is spiritual in the universe as a whole. Siméon (12) discusses the timely subject of patriotism. He finds the usual explanations insufficient and holds that the content of this sentiment is nothing but "the will of a state, of a system of laws" guaranteeing a definite political, social and religious régime, actual or ideal. Its objects are institutions and ideas connected with the territory, not the territory itself. Hall (3) gives a comprehensive study of fears, a "synthetic" study, it is called, because aiming to correlate all the chief lines of investigation of the subject, "genetic," because of its explanatory principles. Fear is defined, in language all too characteristic, as "a protensive or futuristic attitude or orientation

toward a pejoristic state." As against Freud, who interprets its generic form as rooted in sex, its *summum genus* is said to be an inability to cope with life. A list of 136 phobias is drawn up, all duly labeled with Greek names, but the material discussed in detail is grouped under ten heads, one being the polyhyphenated "Rabdo-ballisto-aichuro-acro-merintho-phobias." A vast array of data is brought under survey. The genetic principle is ingeniously applied, being sufficiently plastic to cover symptoms regarded as grotesque variants and intensifications of phylogenetic originals and, again, motor patterns which represent mere scars of ancient fears and which, when called into action, evoke but a faint phosphorescence of the old primordial feeling. The explanations, however, are usually convincing and at worst plausible. At times audacious, as when, *e. g.*, referring the sense of hovering to pelasgic life and that of falling to arboreal, the author on occasion shows commendable caution. Thus, in spite of the evidence which points to an ophidian *Anlage*, which, however, need not be a specific type of imagery, as the basis for the common attitude toward snakes, he confesses that there is something here that we do not know, and a similar hypothesis with regard to an inherited *Anlage* to account for the frequent aversion to house-cats he describes as a *fides quærens demonstrationem*. Incidentally on several occasions he pays his respects to the James-Lange theory; it may hold, he says, for the race, but not for the individual, psychic fears having made the mechanisms. Le Savoureux (6) in an essay on *ennui* criticizes the view of Tardieu that its primary cause is physical or mental exhaustion and contends that it and fatigue are not only different, but opposed. Its essence is found in progressively arrested tendencies which make their action felt while themselves remaining latent. It is the equivalent in the moral realm of the vague feeling of need in the physiological.

On the historical side Titchener (14), starting from a remark of F. M. Urban's that Cournot's speaking of "sensations" of pain in an essay published in 1851 sounds quite modern, since most writers of his time would have called them "feelings," cites passages from French authors of various schools from Malebranche down to Taine and Rabier which show that *sensation* and *sentiment* were not sharply discriminated and that Cournot himself in the essay in question had no settled terminology. The same writer (15) quotes numerous passages from French and German authors which anticipate in certain respects the James-Lange theory of emotion, is

surprised that James makes no reference to his predecessors and regards his acceptance of the complete novelty of his theory as something of a curiosity. In reply it may be said that none of the writers cited express James's theory as he first stated it. Finally, Limentani (7), in the first book published in Italian on the moral theory of Adam Smith, gives a good exposition of that writer's doctrine of sympathy, connecting it with the fuller account given by Hume, which it presupposes, and pointing out that for Smith sympathy is not so much a special emotion as the echo in the observer of every emotion in the one observed.

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ATTENTION

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Nayrac (2) presents a new edition of his exposé of attention, first published in 1906. The main body of the work is unchanged. Two new sections are added, one on the technique of attention, which describes the usual methods of testing attention, the other gives a brief description of a special course of discipline for children, defective in capacity for attention. In addition many references to later work are introduced and the bibliography is brought down to date. Altogether the second edition is some ten pages longer than the first. The work as a whole provides a summary of the work that has been done upon attention in practically all of its aspects. Chapters are devoted to the physiology of attention, its psychology, to the physiological and psychological pathology, and to the education of attention together with a very brief historical introduction and a brief conclusion. Attention is defined and eulogized as "a general phenomenon, an active mechanism which is characterized by the voluntary or involuntary concentration of our activity, mental and physical, to the advantage of an idea or group of ideas" rather than explained. Nevertheless the author gathers together a large amount of data bearing particularly upon the physiological and pathological phases of attention. Most of the symptoms of nervous and mental diseases are referred to disturbances of attention in its different stages of disaggregation. In the final chapter on education most emphasis is put upon habit, and systems are provided that shall deal both with the physical basis as well as give mental drill. It should be added that the work was awarded the Saintour prize of the Academy of Moral and Political Sciences in 1905 and has an introduction by Ribot, a sufficient guarantee of its importance.

Woodrow (3) offers an elaborate investigation of the effect of distraction upon attention. Starting with the familiar proposition that attention may best be measured by determining its breaking force, he replaces the term distraction for his purposes by detraction and attempts to measure the effect of unfavorable conditions upon the strength of attention, using the reaction time as the prime measure of the degree of attention. The first detractor measured is variation in the interval between warning signal and stimulus.

He finds that there is a quickening of reaction with increase in interval up to two seconds and a regular decrease in quickness from two seconds to 24 seconds provided the interval be increased regularly. If the intervals be given in irregular order the average reaction time is longer than the average for any interval used in the regular series. In the second and third portions he extends the method to determine the varying degree in which the variation in the interval affects different unfavorable influences. He finds that the reaction times to faint lights and to slight changes in the stimulus are increased much more by the unfavorable intervals than are those to more intense lights and greater changes. From this he formulates the law that "the absolute detraction effect of a given detractor of attention varies inversely with the degree of attention upon which the detractor acts." From his results he conjectures that the difference between the simple reaction time with a constant two second warning interval and a reaction with an irregular interval between the warning and the stimulus may be used as an inverse measure of attention. He confirms the conjecture by showing that the ordinary distractions are registered by this index, and that it measures the increase of attention with age. He then applies the measure to determine whether practice has any effect upon attention and reaches a negative conclusion. Neither trained nor untrained subjects show either increase or decrease of attention with practice.

Cramaussel (1) reports observations taken on the respiration and pulse of an infant between seven and ten months. The usual changes are found or assumed; increase in pulse rate at the beginning, a slowing at the end of the attentive period, accompanied by vaso-motor disturbances. Respiration is usually checked both in rate and in amplitude. The changes are more sudden and last longer when the attention is of an affective character, are more prolonged but less striking in intellectual attention.

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CORRELATION

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The explanations of correlation still center around the question whether a common "general" factor or "specific" factors common to various processes are most to be emphasized. Spearman and Hart (24) add another fundamental paper toward their demonstration of the importance of the general factor, the efficiency of the entire cortex. New and decidedly original methods for testing their hypothesis are devised. These involve a "coefficient of depreciation," which measures the difference between the average record of groups of abnormal and normal individuals for the same test. According to their theory this depreciation is generally due to a decrease in the general factor, so that the order of merit of a series of different tests as to their efficiency in showing this depreciation should give a correlation of 1.00 with their rank as measures of the general factor (shown by the size of new "coefficients of saturation"). With certain allowances the correspondence between these two orders of merit for 19 tests is found to be .87. Moreover, the ranking of the tests in the order which they show the general factor with a group of insane cases should correlate closely with the same ranking for a group of the sane. This correlation is found to be .73.

Accepting de Sanctis's suggestion Spearman (43) prefers to call his explanation of correlation the "theory of two factors," general and special. Simpson's coefficients of correlation between mental abilities are tested by the criterion which he and Hart previously set forth in their paper on "General Ability." This demands a correlation of 1.00 between any pair of columns of coefficients, provided that the correlations are to be explained entirely by the general factor. With 23 pairs of columns he finds a corrected correlation of .86. In showing this, however, it must be remembered that he rejects 55 other possible pairs of columns as being too much affected by sampling errors. New coefficients provided by the work of Wyatt, Abelson and Webb are also found to conform to this same criterion. One of Simpson's 91 coefficients, that between two cancellation tests, he finds to be too large to be explained by the general factor alone, and four others between the three memory tests and the two discrimination tests are probably explained in part by the specific factors common to these tests. His earlier criterion

for testing the general factor, viz., the hierarchical arrangement of the coefficients, he now states "has turned out a failure. Not, indeed, that it has been convicted of any error. But it has shown itself singularly open to arbitrary usage." For example, he thinks that the hierarchy is clearly present among Simpson's coefficients, but Simpson thinks not. Contrary to Spearman, Collins (12) finds with his tests that "there is very little in common to all mental functions," and Reaney (39) finds no tendency toward the hierarchical arrangement from her tests.

The eugenists (36) have come into sharp controversy over the question whether the method of correlation has given results which enable them to estimate the relative importance of heredity and environment. With such men as Karl Pearson, director of the Galton Eugenics Laboratory, and Major Leonard Darwin, president of the Eugenics Education Society, opposing each other, the scientific world should be able to decide where the merit lies. Major Darwin contends that "it is impossible to compare heredity as a whole with environment as a whole as far as their effects are concerned"; but Pearson believes that the order of coefficients of family relationships which run about .50, when compared with the order of correlations found to exist between abilities and environmental factors, *e. g.*, mental ability and conditions of clothing, myopia and lateness in beginning school, which show a mean value of about .05, does suggest, when properly understood, the relative importance of "nature" and "nurture." Carr-Saunders contends that in these coefficients "the full strength of inheritance has been compared, not with the full strength of environment, but with the average of a number of small isolated aspects of the latter." Pearson shows, however, that an application of the principles of multiple correlation indicates how the full strength of heredity may be estimated and compared with the full strength of environment. If we raise the average environmental correlation to .10 and the various environmental factors correlate among themselves as low as .50, which is a large weighting against the hypothesis of heredity, then, so far as present results indicate, the full influence of an infinity of such environmental factors could only raise the correlation with environment to .1414 as against the single relationship to one parent of .50 or to two parents without assortive mating of .7071.

Stern (44) considers the significance of the work on correlation in relation to the idea of general intelligence and introduces a conception of weak factors being compensated by strong ones. He

suggests that "a truer picture of the total intelligence of the individual is given by the idea of a mutual balancing or compensation of different capacities than by the idea of their equality or correspondence." Evidence for this compensation is found in the fact that the amalgamated rank order for two tests correlates higher with estimates of intelligence than either test alone or than the two tests with each other. Adaptation of Ries's results is given to demonstrate this. He, therefore, advises that if we wish to gauge general intelligence by tests we should seek that amalgamated combination of tests which correlates most highly with estimated intelligence and not select the tests on the basis of their high intercorrelations with each other.

It is a pleasure to find an exhaustively intensive study of one test—the memory for sentences. Gassmann and Schmidt (**20**) carry out such a research through three monographs, culminating with the psychological explanation of the correlations found between the extent of the memory, the individual variability, the relative amount of senseless syllables added, and ability in school performances. The type of mind which mechanically and formally reproduces the sentences is compared with that which attends to the content, thus supplying a relatively larger number of sensible syllables. By this and similar analyses the authors conclude that the most significant relationship is that between a large proportion of sensible syllables supplied and a large variability in performance, both showing a certain independence of thought with attention to the content.

When we examine the improvements in method which have been made since the last resumé, we find ourselves getting notably nearer to the goal of measuring causal relations through correlation. The most important contribution is a "Variate Difference Correlation Method" which has been developed coöperatively by Cave, Hooker, "Student" (**45**), and Anderson (**2**). The method aims to eliminate the spurious correlation which is due to two factors both changing with time or space, perhaps the most fruitful source of fallacious arguments from correlation coefficients. The procedure consists in correlating successive *differences* of each of the variates until the coefficients tend to become steady. When sufficiently long series are available with biometric data, we may discover whether there is a true relation between two factors independent of their common growth factor. Pearson and Cave (**11**) illustrate how correlation between tobacco consumption index and savings index

changes from + .98 to − .43 after the spurious time factor is eliminated. The increased tobacco consumption seems, therefore, to go with the "pipe of the unemployed at the street corner rather than the increased expenditure of the fully occupied artisan." Further we find (45) that the relation between wages and marriage rate changes from − .52 to + .55 after allowance for the difference in these variates from year to year. The method is hailed as giving "hope of greater results than almost any recent development of statistics" (11).

Continuing the summary of the mathematical development, we note that Kapteyn (28) supplies for the first time, he thinks, an acceptable definition of a correlation coefficient which is neither 1.00 nor 0.00. He demonstrates an exact statement for "r" which signifies that it is a fraction depending upon the error in the two variates which is common to both of them. In two additional papers (14) Deuchler completes his description of the methods for measuring the relationship of quantities. He gives his own method of measuring the correlation of ranks and compares it with Spearman's two methods, which he thinks are less satisfactory. Contingency and the product-moment formula are also presented with illustrative examples. For those engaged in extensive statistical work the tables which have appeared in *Biometrika* are now assembled in a single volume of about 150 pages of tables and 75 pages of introductory explanation and illustration (38).

Pearson (35) extends his method of determining the correlation by ranks or grades to cases where one of the variates is given quantitatively or by broad categories, the other being given by ranks or by grades. Brevity forbids referring to several other papers except by their titles, which indicate their purposes (9, 23, 27, 37, 40, and 42).

New ways of applying the correlation method show its increasing importance as a tool in psychological investigation. Multiple correlation especially is demonstrating its usefulness in analyzing the factors involved in a relationship. By partial coefficients Hart and Spearman (24) calculate the correlation due to "specific" factors tested, independently of that due to the "general" factor. They find no indication of special powers of the mind even in case of insanity and related maladies which the current view attributes to interference with particular mental processes. On the other hand the depreciation in those tested abilities which correlate most highly with the "general" factor indicates that the insanities

involve a lowering of the whole intellectual level. Wyatt (52) applies multiple correlation to disentangling the common factors reached by four memory tests and finds no general memory faculty. Barrett (4), Collins (12), Hollingworth (26) and Mulhall (31) also find no evidence of faculties, while Downey (17), in a study of reading and writing mirror scrip and inverted writing, bids fair to shed some new light on generalized habits. Partial correlation disproves the supposition that literacy and school attendance contribute to criminality in Egypt. Although they correlate closely, the relationship is shown to be due to the factor of density of population (25). Regression coefficients permit Elderton (18), with the Glasgow measurements, to present tables for the first time for mean weight for any height from 6 to 14 years of age.

Experimental methods are beginning to be evaluated by correlation. Barrett (4) finds that the more laborious method of paired comparisons, when applied to judging weights, handwriting or beliefs, is in no way to be preferred to the simpler order of merit method. The form of examination based on the Ebbinghaus completion test proves as reliable as the more time-consuming older types of quiz (6). A much simplified form of the McDougall spot-pattern test gives almost the same results as the complicated test (22).

Münsterberg (30) suggests the larger use of descriptions by poets and writers for working out a correlated description of mental traits as viewed naïvely in society. Pannenborg's description (34) of the relationships of wanton acts to personal traits as found in biographies illustrates this line of work. Kellogg (29) also uses correlation in the study of feeling.

The relations of various factors affecting the same process is a fertile field of correlation analyses. In this connection the judgment process comes in for extensive study by Hollingworth (26), Mulhall (31), Bridges (8), and Downey (16). In connection with the memory processes we find papers by Winch (49), Myers (32, 33), Brown (10), Wells (48), and a combined study at Vassar (1). Sex differences are discovered with the three-word test (21) and by Collins (12).

The number of researches in which the correlation between tests or between tested and estimated abilities is presented has become so large that it is not possible to more than list them. Collins (12) publishes one of the most extensive studies on the correlations between school grades and tests of sense discrimination,

attention, perception, memory, association and motor control. It raises the question whether the low correlations found may not be due to using the teachers' grades without conversion. Hart and Spearman (24), with their numerous tests, conclude that their comparatively low correlations of tests with estimates of ability is due to inaccuracies in the latter. Vickers and Wyatt (47) also present an extended study of the intercorrelations of tests. Arithmetical and reasoning tests are studied by Winch (50, 51), Dockerill and Fennings (15), and Davies (13). The inter-relations between the fundamental arithmetical operations as given by the Courtis tests are shown by Bell (5). Arithmetic stands apart in its lack of correlation with school subjects (7). Frailey and Crain (19) study the relations of school standings intensively, but fail to simplify their statements by giving correlations. Baldwin (3) provides the most valuable data available for consecutive measurements on the same children and states some of the observable relations, but without coefficients. General intelligence correlates .32 with ability in group games with allowance for constant age. The importance of estimating the influence of age is shown by Smith's study (41). He demonstrates empirically that brothers and sisters correlate in pitch discrimination no closer than younger and older children from different families. Unless partial coefficients for age constant are calculated, therefore, the size of correlations with heterogenous age groups lacks meaning. Sylvester (46) finds a minus relation, $-.384$, between age and motor control in the form board test.

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TESTS

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There has been manifest during the past year marked activity in the critique of test methods as compared with the elaboration of new tests. About half of the articles which have been used for this report are either reports of experimental investigations made to test the scope or validity of some test method or consist in theoretical discussions of the technique of testing. The other articles contain a description of new tests or of some modification of old ones. About one quarter each have to do with test series and with tests of special forms of mental ability, one third with tests of efficiency in some phase of school work and the rest with general topics.

There is space only to indicate in a word the nature of the articles listed below. Claparède (4) attempts a criterion regarding the basis of proficiency in different tests. Weiss (24) and Kelley (13) discuss the index method of scoring tests. Thorndike (23 and 20) discusses the method of testing by series of graded difficulty. Kehr (11) has arranged three groups of tests of ten each, mostly taken from the Binet series and repeated with different requirements in the three groups, each group being intended for the identification of a three year development period. Buckingham's study (3) is critical and raises certain general questions which are of importance in testing. Pintner's methods (15) and conclusions are called in question by Kelley (13) and the two should be read together. Peterson (14) describes a new test for generalizing ability. Rupp (18) makes an elaborate analysis of musical ability and describes tests, giving some results. Winch (25) describes tests which demand insight into various forms of logical relation. Woodrow (26) describes a new method. The contents of the other articles are indicated by their titles.

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SPECIAL REVIEWS

A First Book in Psychology. (Fourth Rev. Ed.) M. W. Calkins. New York: Macmillan, 1914. Pp. xxi + 428.

An introductory text-book that has passed into the fourth edition is its own justification. Miss Calkins's volume is technical without being dry, and entertaining without being superficial. The new edition contains no essential changes either in content or in arrangement from the earlier ones. In the last preface, the author calls the reader's notice to a fuller discussion than before of attention, conception and emotion. A greater systematic consistency has been secured by using the term consciousness as the equivalent of "the self's relatedness to its objects." Other minor changes are noted.

The popularity of the present work need not strike alarm within the breasts of behaviorists and idea-psychologists. A triumph of self-psychology is not thereby implied. Indeed an examination of the text reveals that, aside from the Introduction, the self plays no absorbing rôle. A notable hiatus would be filled if a chapter on the self were really given in which its analysis and the theories of its analysis could be displayed. In the reviewer's experience, as the matter now stands, the references to the self, if taken at their face value, serve merely to give the student a sense of concreteness and of nearness to everyday life. If analyzed, the references can be interpreted as well or better from the standpoint of "idea" psychology.

Probably the weakest points in Miss Calkins's exposition are the chapters on Instinct and Learning, Judgment and Reasoning, and Emotion. Brief comments here will not be amiss. The discussion of instinct is extremely sketchy. This is undoubtedly a result of the self-psychology point of view and of the union of the topic with that of perception and imagination. In the treatment of judgment and reasoning, the author's style loses its accustomed lightness. The spirit of the chapter is more logical than one might desire. The section on emotion is the longest in the book, and yet one misses the James-Lange theory and a reference at least to Shand's theory of sentiments with its social implications.

In the analysis of conception Miss Calkins states that the

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"feeling of generality" constitutes a concept of any content with which it fuses: sensation, image, relation, will or emotion ("when I think of fear, the consciousness of generality accompanies a genuine, though certainly faint, experience of that emotion"[1]). The full consequences of such a valuable statement are however not developed. If a sensation plus a feeling of generality constitutes a concept, the discussion of conception (in this and in other texts) should not place such overwhelming emphasis upon the image. And in treating of connected trains of thought, the reader should be confronted in unmistakable terms with the existence of sensory thought, *i. e.*, a succession of sensory concepts. This leads up to a reformulation of the law of association as given by Miss Calkins and others. *The revived or recalled element need not be an image.*[2] It may be, and very often is, a *perceptual experience*. Ability to reinstate a sensation (or other element) depends upon the control that may be exercised over its stimulus. One cannot recall a visual perception because one cannot by willing produce light. (This is true, *mutatis mutandum*, for other senses where the stimulus must be outside the organism.) However the visual sensation of an object may arouse the tactual and kinæsthetic *sensations* contained in trembling, smiling or in any other activity which has been *associated* with it. In these cases one *can* by willing produce the stimulus for the revived sensory experience even as he can for a revived imaginal experience. Speech and affective memory are cases in point. Such a total view might well be termed a "*theory of sensory dominance.*"

WALTER S. HUNTER

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Psychological Experiments. J. V. BREITWIESER. Colorado Springs, Colo.: Apex Book Co., 1914. Pp. 187.

This little book containing one hundred and sixty-eight demonstrations and experiments has been prepared for the author's students. Its usefulness to them makes him think that it may supply a long-felt want of other students. There is some ground for this belief. One of the merits of the book is the incompleteness of the description of procedure and results. Enough is given to enable students to experiment but not so much that they do not need to observe and think for themselves. To insure success, a

[1] P. 147.

[2] See Calkins, p. 116, and Titchener, *Text-book*, p. 378.

teacher is also needed to explain, suggest and supplement. The descriptions of experiments and materials save time for the teacher but do not prevent him from having the work carried on according to his own ideas.

In the beginning general instructions are given students as to how to make experiments and keep records. There is also a brief discussion of statistical methods, terms and formulas and directions for dissecting out the brain and spinal cord, and demonstrating their gross anatomy. There is no discussion of the anatomy of the sense organs, probably because it is expected that that will be studied in the class work carried on in connection with the laboratory course. About half the experiments are with sensations and most of the others with perception, motion, and simple reaction time. A very few are concerned with higher mental processes.

There are no references to authors or books that treat of the experiments. The book has a table of contents and an alphabetical list of materials and the numbers of the experiments in which they are used, but no other index. The printing and binding of the book are decidedly poor. There are also some defects for which the author is responsible that are not merely instances of incompleteness. For example, experiments 111 and 114 are identical in wording and there is no clear indication as to just what is to be done in relation to other experiments. Again, the description of how to make tests of visual acuity is decidedly defective. The usual cards for testing eyes are presupposed. He says, "Proceed from the larger to the smaller characters until a line is reached in which mistakes are made. Move nearer and repeat the experiment. The subject, of course, will then be able to read the smaller characters. The visual acuity is denoted by a fraction of which the numerator represents the distance at which the letters could just be read and the denominator represents the distance at which they should be read." If the test is to be made in this way larger and smaller letters on the chart are useless.

To sum up, the book has nothing original in it and the experiments and directions are not standardized, but it contains suggestive descriptions which may be very useful to students and to young teachers who are working out a laboratory course.

E. A. KIRKPATRICK

FITCHBURG NORMAL SCHOOL

Sex and Character. O. WEININGER. London: W. Heinemann; New York: Putnam, (no date). Pp. xxi + 349.

It seems necessary to assure the reader that the following review is an honest attempt to give an outline of the main argument of Weininger's *Sex and Character*, not a distorted account made up from isolated passages. There is, he tells us, such a thing as pure masculinity and likewise pure feminity, though they never exist in any one individual in pure form. All human beings are mixtures of these two elements in proportions varying all the way from fifty per cent. of each to an almost pure form. Many individuals whom we, on the basis of the mere external appearance of sex, rank as masculine should really be classed as feminine because their composition is more than fifty per cent. feminity, and vice versa. The perfect form of sexual attraction exists only between two individuals whose proportions of masculinity and feminity are such that when added together they yield one hundred per cent. of each. Pure masculinity contains two elements, intellect and sexuality, while pure feminity contains but one, sexuality. The proof that women have no intellect is that they have no memories. Memory is necessarily the prerequisite for logical thought and for ethical action, and a being like woman who has no memory can therefore have neither. Experimental psychologists who think they have shown that women have better memories than men have merely displayed their own stupidity in supposing that such methods as they employ could throw any light on the question. Now memory with its resultant powers of thought and action is the basis of personality, or soul. It follows that women cannot possess personality or soul. While men, therefore, are immortal, women are mortal. With their total lack of understanding or of ideals, and their complete limitation to sexuality as a content of consciousness, they are the source of all the evil in the world. The only hope for humanity is for men to refuse to have any sexual relation with them. That would mean death for feminity within a brief space of years, but men, since they are immortal, need have no fear of the outcome for themselves.

In the last few chapters he takes occasion to satisfy his anti-Jewish prejudice by asserting that all Jewish men are exceedingly feminine. That should of course mean either that all Jewish women are exceedingly masculine, or else that among Jews sexual attraction does not exist. He gives no indication as to which alternative he prefers.

But it is useless to begin pointing out inconsistencies in such a document. The book impresses one as a remarkable record of a paranoiac mind dominated by two obsessions, first hatred of women, and second hatred of Jews. It displays a wide acquaintance with the literature of psychology and philosophy. It is written with a heroic attempt to preserve an atmosphere of dispassionate philosophic discussion, but the serenity is frequently broken by spiteful outbursts about what all women always do, and what no man ever does, which are worthy of any old gossip of either sex. It is only fair to say that the poor young author displayed the full courage of his convictions by committing suicide at the age of twenty-four. The book was first published in Germany in 1907. The only excuse for reviewing it now in this publication is that its six German editions and its translation into English have given the impression that it constitutes a real contribution to the psychology of sex.

HELEN T. WOOLLEY

CINCINNATI, O.

The Brain in Health and Disease. J. S. BOLTON. New York: Longmans, 1914. Pp. xiv + 479.

This is a book of some 470 pages, profusely illustrated, and is to be regarded, in the words of the author, "as a treatise on general cerebral physiology and pathology and not as in any sense a text-book, monograph, or dissertation on mental disease." It embodies the results of his own experience in English asylums for the past eighteen years.

The portion on cerebral function in the normal brain occupies about a quarter of the volume. A quotation (pp. 51–52) may give better than any words of the reviewer an idea of the author's general line of thought concerning the functions of the brain. "I would regard the human cerebrum, not as a sensori-motor, but as an intermediate or associative ganglion, which, on the one hand, receives sensorial impressions and elaborates them, by processes of association, into the physical equivalents of psychic products of higher complexity, and which, on the other hand, to a variable extent controls, selects, and coördinates certain of these equivalents, eventually transforming them into further physical complexes, whose function is to set in action the lower motor centers. On this functional basis I would divide the cerebrum into pre- and post-Rolandic portions, the former of which possesses controlling and executive functions, and the latter receptive and elaboratory.

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"I would subdivide the pre-Rolandic part, or frontal lobe, into a posterior or psychomotor area which is concerned with the evolution of such physical complexes as are necessary to give external expression to the results of cerebral association; and into an anterior or pre-frontal area which is able to control, select, and coördinate certain of the results of post-Rolandic cerebral association, and either to allow these to undergo psychomotor transformation or to inhibit this process. Both these functions I regard as proved, and I consider the outer cell- or pyramidal lamina of the cortex to be at least the chief seat of their actual performance . . . and the middle cell- or granule-lamina of the projection areas as the region concerned with the reception and immediate transformation of sensorial impressions." "The inner cell- or polymorphic lamina . . . must be regarded as subserving such organic and instinctive activities as are not acquired by education."

On the pathological side, the author divides all diseases into amentia on the one hand, and dementia on the other. Amentia is defined as "the mental condition of patients suffering from deficient neuronic development" and includes such troubles as recurrent insanity, hysteria, epilepsy, and paranoia. Dementia is defined as "the mental condition of patients who suffer from a permanent psychic disability due to neuronic degeneration following insufficient durability." The point of view throughout the pathological portion of the work is, thus, that of brain pathology and is quite innocent of any appreciative tinge of the more modern psycho-therapeutic thought. Hysteria is, for instance, divided into neuropathic and psychopathic types, the latter including "cases of psychasthenia who are fit subjects for treatment by suggestion, or, *to use the modern terminology*, psychoanalysis and psychotherapy." (Italics the reviewer's.)

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DISCUSSION

A DEFENCE OF PSYCHOLOGY AS SCIENCE OF SELVES

I am writing in reply to the paper on "Psychology as Science of Selves" which appeared in the *American Journal of Psychology* for January under the name of Josephine Nash Curtis. This paper criticizes the teachings of Miss Calkins explicitly, unfavorably

and in minute detail.[1] I am not a thoroughgoing self-psychologist. On the contrary, I have always been proud to wear the colors of the arch-structuralist from whom I received my training. Nevertheless, I feel called to defend self-psychology. My qualification consists in the fact that I believe that I understand Miss Calkins's doctrine of the self better than Miss Curtis understands it. I can, in all sincerity,—at least, so I believe—take the *doppelte Standpunkt* recommended by Miss Calkins years ago. If I be a self-psychologist, I am still at the level of the double standpoint. I have not kept pace with the "increasing claims" of self-psychology. I have never thought for a moment that psychology could be most "effectively" treated if worked out exclusively from its point of view.

Miss Curtis takes up in order the root of Miss Calkins's psychology—namely, her doctrine of the self—her method, her problem, and her results, and rejects or depreciates each in turn. I shall follow the same order.

1. The doctrine of the self is the *crux* of the whole matter. If one can once understand what Miss Calkins means by that self of which one is always conscious, then one finds all her other contentions at least intelligible. The understanding comes suddenly like the reversal of perspective in the staircase illusion. When you have once had the reversal, you can always get it again but you can also go back at will to seeing your staircase in the old way. Miss Calkins's self is the individual (separate) "*I am*," *I—being conscious—am, cogitans sum.* The self is the knower, the experiencer. How can the knower get out of himself to define himself? Every effort to do so must move in a circle, but to borrow an old figure for a new use, "it is a circle within which everything lies." Miss Curtis notes that Miss Calkins says that the self cannot be defined, but because Miss Calkins says that everyone knows what the self is, Miss Curtis has taken pains to ask several specimens of "plain man" what they meant by the *I* (p. 73). But why should the plain man be expected to define the indefinable either better or worse than the psychologist? And why should the selfist be expected to define the self any better than the structuralist defines experience? The structuralist says: "We assume that everybody knows, at first hand, what human experience is. . . . Unless we

[1] It can scarcely be alleged that Miss Calkins is the only self-psychologist. Robert Yerkes appears to be another. Cf. his "Introduction to Psychology," pp. 15, 17, 53, *et al.* Approximations toward self-psychology are to be found in the writings of Angell, Judd, McDougall and others.

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know, by experience itself, what experience is, one can no more give a meaning to the term 'mind' than a stone can give a meaning to the term 'matter.'" The structuralist deals with experience; the selfist deals with an experiencer; neither can define his material. Structural psychology may be greatly preferable to self-psychology —in many respects, I prefer it myself—but the advantage can scarcely be said to rest upon precision of definition.

Having stressed the indefinibility of the self, I shall pass to Miss Curtis's complaint that Miss Calkins does not make her conception of the self "clear" (pp. 72–75). If, as Miss Curtis says, Miss Calkins's self is evidently "not merely the sum-total of its perceptions, emotions and the like," how can Miss Calkins make it clear? It is only the sensational and imaginal components of consciousness which can be clear in the technical sense and only in so far as experiences are made up of them can experiences be described in such terms as to arouse clear ideas in the "reader's mind." By *not clear* Miss Curtis may simply mean *inconsistent*, but her insistence that Miss Calkins should at least distinguish the self from things, the subject from the object, the knower from the known, makes me suspect that she, as a sensationalist in psychology and an imaginal-minded person in ordinary life, is craving for the sort of description which in the nature of the case, she can never have, a description which will make the self *anschaulich*.

The last sentence suggests a word or two as to the method by which Miss Calkins finds this self of hers. There are some mental make-ups which have a definite "set" toward sensationalism in psychology. I have one myself. Even when I am thinking about the self, my experience consists not merely of a pretty steady flow of internal speech but also of an eddy of visual images, ill-defined but brightly colored, and of faint dashes of visceral sensation, which come at times with the *buts* and *ifs* and the like. I do not find by introspection, in the narrow and standard sense, any non-sensational and non-affective elements in my own experience. Perhaps I do not know what to look for but, in any case, I cannot find any. Yet I am conscious of myself and I find it not *by* introspection but *in* introspection. Miss Curtis asks: "What answer can Miss Calkins make to the person who says, 'I do not know what the I is?'" The retort is easy. Miss Calkins would ask, "Who is this I who does not know what the I is?" The self is the introspector. When I can see my own eyes without a mirror, then I shall be able to find my own self by introspection. Neither do I find the self by reason-

ing. The fundamental *I am* is not a judgment and far less is it a verbal assertion. It is not peculiar to man as the talking animal; if it is peculiar to him, he must be the only conscious animal. When one is self-conscious in this sense, one is not conscious of being conscious of being conscious in any metaphysical merry-go-round. In Miss Calkins's words, one is "directly" or "immediately" conscious of oneself and this is all that can be said of this form of awareness because it is not like any other. When the self tries to examine itself as knower—a performance which no psychologist but only a philosopher would attempt—it fails because subject and object do indeed "coalesce." Since the self is in some way conscious of itself, it can have itself as an object but not as subject-matter for introspection in the standard sense. Miss Calkins teaches, to be sure, that one may be attentively conscious of self but I do not see how this can be, for attention to the self should make it clear and the self is never clear in the same sense as that in which percepts and images are clear. The stressing and the slurring of the self seem to me something different from attention and inattention. But, in any case, the self can have, since it *does* have, both as object and as subject-matter for introspection in the narrower sense, its own experiences or "attitudes" or "relations." If the scope of psychology is to be confined absolutely to the data furnished by the kind of introspection which can be applied to sensation complexes, then selves in themselves must go, but, far gone in iniquity as I must seem, I do not grant the premise.

I now come to Miss Curtis's criticism of the characters which Miss Calkins attributes to the self (pp. 78–85). It is perfectly true that they do not serve to distinguish the self from ideas and mental functions, that uniqueness seems to reduce to the rather barren character of self-identity and that relatedness does overlap persistence, uniqueness and complexity. I do not understand, however, that Miss Calkins is trying to distinguish the self from ideas or functions or that she means the characters to be mutually exclusive. She is stating properties, not *differentiæ*. Thus, one might describe experience as in constant flux without meaning such a description to be definitive. Since *the self's relation to its object* is used as a synonym for *consciousness*, relatedness must, of course, include the (direct) consciousness of persistence and the consciousness (which does not seem to me constant or direct) of uniqueness and complexity. I may say, in passing, that I think it unfortunate that Miss Calkins should use the word *relation* in the sense just

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noted and should also treat of *relational* elements of this relation. In the preface to the fourth edition of the *First Book*, she herself has attempted to remove all occasion of stumbling (p. xiii). I think, however, that the absolutely unique subject-object relation should have a term all to itself and I wish that Miss Calkins would fall back on the old term *experience*. Her other synonym, *personal attitude*, I much dislike, both because it suggests *Bewusstseinslage* and because it is symbolized for me by a most unfit concrete visual image, derived, I think, from an old picture of Moses with his arms held up by Aaron and Hur.

To one who understands what Miss Calkins means by the self it seems strangely beside the point to insist that one is as often conscious of one's non-persistence as of one's persistence, and that if one regards oneself as unique, one cannot always regard oneself as persistent (pp. 79–82). It is true that we—as plain men—speak of "losing ourselves" and being "beside ourselves." It is true that we have selfless moments, in Miss Curtis's sense of the term self, when we are absorbed in novel-reading. But whatever self-consciousness may mean to the plain man it does *not* mean the same thing to Miss Calkins and to Miss Curtis. To take an extreme instance of selflessness (suggested by one of Miss Curtis's quotations from James) (pp. 76–77), in the horrid moments of recovery from half-an-hour's general anæsthesia, the mass of organic sensations may be new to us, and all memory images—even the mental picture of that "outward man" which we tend day by day—may fail, and consciousness may be reduced to the level of an uncomfortable new-born baby's, but yet Miss Calkins's self will be there to do the feeling miserable. I think that I understand also what Miss Curtis means by the self and I fully agree with her that we are as often aware of the non-persistence as of the persistence of this self.

I now come to my last point in regard to the self. One of the charges which Miss Curtis presses most earnestly is that Miss Calkins fails to distinguish the self from things (p. 73). How can she? Why should she try? Can any of us put into words the difference between mental process and bodily process? As psychologists do we need to try? The structuralist has experience, a nervous system with its processes, and extra-bodily stimuli, environment, situations. The self psychologist has an experiencer, its experience, impersonal objects, which include nervous systems and extra-bodily stimuli, and personal objects other than self. No scientist is called upon to define his fundamental postulates. This

is axiomatic. The trouble with Miss Calkins is that she has *in full swing* two more indefinables than has the structuralist, namely, the experiencer and the other selves. The reason that I prefer to be a structuralist whenever I can is that I am afraid of indefinables. They lead one into mischief. I fully agree with Miss Curtis that the structuralist method of regard is to be preferred just because it is abstract (pp. 96–97)—*i. e.*, I think it is to be preferred as far as it will go and it will go far. But if one realizes that indefinables are there, one cannot get rid of them; one can only abstract from them. And sometimes they compel one to notice them. I have yet to see an adequate treatment of social psychology by a consistent structural psychologist. To my mind self-psychology is worth while, not because it tells us anything worth knowing about the self in itself, that self which is not open to introspection, but because it gives standing ground for the scientific treatment of the relation of person to person.

2. In regard to Miss Curtis's criticism of Miss Calkins's method (pp. 89–91), I have five points to make:

(1) Miss Calkins indicates explicitly that when she uses the term reflection technically, she means looking-back or retrospection.[2] Now although the method of the trained observer approximates more and more to true introspection yet the line between retrospection and introspection remains pretty hard to draw. It is not so very long since we were all taught that introspection is essentially retrospection.

(2) If introspection is valid only when it is "attention under instruction and report" how do we ever dare say anything about such elusive processes as pleasantness and unpleasantness? Introspection in the sense of the definition quoted by Miss Curtis is, of course, the standard method of psychology, but to maintain that it is the only method worth applying seems to me to lead to absurd consequences.

(3) Miss Curtis's bald statement that "it is not true that reflection is a method of science"[3] is to me astounding. If reflection in the ordinary sense, is a necessary adjunct to observation (as Miss Curtis grants), it is, of course, a part of scientific method. This is not mere cavil on my part. To depreciate "reflection" is to go back historically from Galileo to Francis Bacon.

(4) I never yet saw a classification of emotions, habits, instincts

[2] *First Book in Psychology*, p. 12, second paragraph, every edition.

[3] Second foot-note to p. 89.

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or temperaments, structuralist or otherwise, which was not largely a product of reflection in the sense in which reflection is reprehended by Miss Curtis. But this point is simply *argumentum ad hominem* and I will not press it. I am reminded of the old lines:

> "Geographers, in Afric's maps,
> With bears and lions fill their gaps,
> And over uninhabitable downs
> Paint elephants instead of towns."

The sword cuts both ways—cuts most of us, in fact. But the mere mention of bears and lions makes me wonder whether Miss Curtis would confine animal psychology to the observation of movement and, if not, how she would outline for it a consistent and fruitful procedure. Even the plainest argument from analogy is reflection, not observation.

(5) Self-psychology is avowedly in its infancy. It seems not impossible that in the future the relation of self to self should be submitted at least to the semi-experimental method of "controlled introspection." I do not think that this relation is entirely open to such introspection but I believe it is partially open.

3. As regards Miss Calkins's problem, Miss Curtis argues that because Miss Calkins holds that self-psychology is closely "allied" to a discipline suggested by Münsterberg and christened "history," and because Münsterberg's problem is to interpret the willing subject, therefore Miss Calkins's interest is primarily in finding "logical" meanings and practical applications (pp. 91–92). To this I can only say that if Miss Calkins's problem is either metaphysical or ethical, she has solved it rather badly and has introduced only a little relevant and a vast deal of irrelevant matter.

4. Miss Curtis's criticisms of Miss Calkins's results reduce to three. (1) Miss Calkins, she notes with surprise (p. 94), treats the conventional list of psychological topics. But why should Miss Calkins refrain from doing so? Self-psychology differs from other forms of psychology in its method of regard but it claims the whole subject-matter of psychology. Why should Miss Calkins not draw from the common stock of results experimentally established? As a matter of fact, she does draw from it pretty liberally—more so than one who reads her books with an eye only for her peculiarities is likely to realize. Incidentally, it may be remarked that not all of her peculiarities are to be laid at the door of self-psychology.

(2) As regards the material peculiar to self-psychology, Miss

Calkins is said not only to speak *ex cathedra* but to speak as if from an *arm*-chair and the teachings which issue from this place of repose are said to be such as any logician or "even any plain man who is skillful in drawing distinctions" could utter (pp. 94–95). Be this as it may, I do not believe that Miss Calkins would insist greatly upon any one of her doctrines excepting only upon the possibility and the need of having a self-psychology. A style which is as terse and vivid as hers in the *First Book* is apt to ring with a certain tone of finality, which may belie the real attitude of the writer.[4]

(3) Miss Curtis suspects Miss Calkins of an unholy desire to make psychology propædeutic to sociology, ethics and pedagogy (p. 95; cf. p. 92) but hints that much of its material may have been actually filched from these sciences (pp. 97–98). But whether we like it or not, the sciences will overlap both one another and the technologies. It is part of that continuity of nature which led Anaxagoras to say "There is something of everything in everything"; and "Things are not cut off with a hatchet." Self-psychology lies in the border-land between structural psychology and the other *Geisteswissenschaften*. Sometimes I have wished that another name could be found for a study so different as self-psychology in some of its features is from structural psychology. Yet it *is* psychology in the wider sense and it seems to me to have a *raison d'être*. Such studies as Mahaffy's "Homeric Greek" and Taylor's "Mediæval Mind" do not seem to me history pure and simple. If the structural psychologist is to enter the field of social relations at all, he must at least *talk* of persons and I cannot myself think out the interrelation of persons in terms of a consistent structural psychology.

In conclusion, I wish to mention a point upon which I feel strongly. One can easily understand, upon historical grounds, why the psychologist should love the company of the physiologist and the physicist and should fight shy of the sociologist and the moralist, and studiously eschew the companionship of the philosopher. But at present, there seems to me no good reason for making the border-line between psychology and the physical sciences

[4] It has occurred to me that an accident of style may contribute to the impression that Miss Calkins sets up her own introspection as authoritative. In describing experiences she habitually uses the pronoun *I* instead of the colloquial *you*, the intimate *we* or the rather awkward *one*. (Thus, for example, "As I look from the sail on the horizon to the rosebush on my window-sill my eyes converge.") Palpably absurd as it is to take this pronoun seriously, yet impressions which will not bear analysis often lead to unjust estimates both in literature and in life.

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as tenuous as the boundary between the United States and Canada, and then guarding the opposite border with a double row of fortresses. The most dangerous invaders now to be discerned seem to me to be upon the biological and psychiatrical boundary-lines, even if they be not already over and making prisoners in our very midst. But in any case, commerce is usually advantageous even across an armed frontier.

ELEANOR A. McC. GAMBLE

WELLESLEY COLLEGE

BOOKS RECEIVED

HEALY, W. *The Individual Delinquent. A Text-Book of Diagnosis and Prognosis for all Concerned in Understanding Offenders.* Boston: Little, Brown, 1915. Pp. xvi + 830. $5.

CHURCH, A. & PETERSON, F. *Nervous and Mental Diseases.* (8th rev. ed.) Saunders, 1914. Pp. 940. $5.

ELLWOOD, C. A. *The Social Problem. A Constructive Analysis.* New York: Macmillan, 1915. Pp. xii + 255. $1.25.

HÖFFDING, H. *Modern Philosophers and Lectures on Bergson.* Trans. by A. C. Mason. London: Macmillan, 1915. Pp. xii + 317. $1.40.

RHYS DAVIDS, C. A. F. *Buddist Psychology. An Inquiry into the Analysis and Theory of Mind in Pali Literature.* London: Bell (New York: Macmillan), 1914. Pp. xii + 212. $1.

MARTIN, L. J. *Ein experimenteller Beitrag zur Erforschung des Unterbewussten.* Leipzig: Barth, 1915. Pp. 164. M. 5.

MURRAY, E. R. *Froebel as a Pioneer in Modern Psychology.* Baltimore: Warwick & York, 1914. Pp. viii + 230.

WINCH, W. H. *Children's Perceptions. An Experimental Study of Observation and Report in School Children.* Baltimore: Warwick & York, 1914. Pp. x + 245. (Educ. Psychol. Monog. No. 12.)

WHIPPLE, G. M. *Manual of Mental and Physical Tests. Part I: Simpler Processes.* (2d rev. ed.) Baltimore: Warwick & York, 1914. Pp. xvi + 365.

BRUCE, H. A. *Psychology and Parenthood.* New York: Dodd, Mead, 1915. Pp. xi + 293. $1.25.

SHEARER, E. A. *Hume's Place in Ethics.* Bryn Mawr, Pa.: Bryn Mawr College, 1915. Pp. 86. 50 cents. (Bryn Mawr College Monog., 17.)

CARUS, P. *K'ung Fu Tze. A Dramatic Poem.* Chicago: Open Court, 1915. Pp. 72. 50 cents.

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NOTES AND NEWS

PRIZE IN PSYCHOPHYSICS—Professor E. B. Titchener informs us that, owing to the international composition of the judging committee, the award of this prize (see the BULLETIN, Jan. 15, 1914) must be postponed till the conclusion of the present war.

THE American Psychological Association and the psychological division of Section H of the American Association for the Advancement of Science will hold a joint meeting in San Francisco, August 2nd to 7th. Full details regarding the meeting will be sent to the members of both associations soon. Announcement of papers offered for presentation at the meetings should be sent to Professor Lillien J. Martin, chairman in charge of the psychological meetings.

A PRIZE of $1,000 is to be awarded by the American Social Hygiene Association for the best essay on social hygiene for adolescents, to be submitted to the Association by July 31, 1915. Full information may be obtained on application to the Association, 105 West 40th Street, New York City.

We are glad to announce that the report of the death of Dr. A. Marie, director of the psychological laboratory at École des Hautes Études, which was printed in the March BULLETIN, is not true. Dr. Marie was wounded, but is now in a fair way to recovery.

DR. M. BERNHARDT, of the University of Berlin, well known for his contributions to neurological literature, has died at the age of 70.

DR. FRANKLIN O. SMITH, assistant professor of education at the University of Utah, has resigned his position on account of present conditions at the University.

PROFESSOR J. MARK BALDWIN has been appointed Herbert Spencer Lecturer for 1915 at Oxford University. He is the first foreigner to hold this position.